

# New Fire Fighting Technologies

## Aircraft Rescue & Fire Fighting Research

Presented to: COE for Airport Safety Technology  
Public Meeting

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**Federal Aviation  
Administration**



# Program Objectives

- **INCREASE POST-CRASH PASSENGER SURVIVABILITY.**
- **Improve current levels of fire fighting effectiveness.**
  - Use of new technologies in ARFF vehicle design
  - Use of new technologies in fire fighting agent delivery systems.
  - Use of new fire fighting agents



# ARFF Research Program



New Fire Fighting Technologies – FAA ARFF Research Program



Federal Aviation  
Administration

# ARFF Research Program Facility





# Extended Capabilities - Tyndall AFB



# New Large Aircraft Fire Test Site



# New Technology in ARFF

- **Alternative Fire Fighting Agents**
- **Composite Material Fire Fighting**
- **Interior Access**
- **New Fire Fighting Agent Discharge Technologies**
- **Operation of NLA**



# Alternative Fire Fighting Agents

- More effective agents
- Reduce environmental impact
- Agents for multiple Classes of fire



ASTM Aquatic Toxicity Tests



Mil-Spec Live Fire Tests



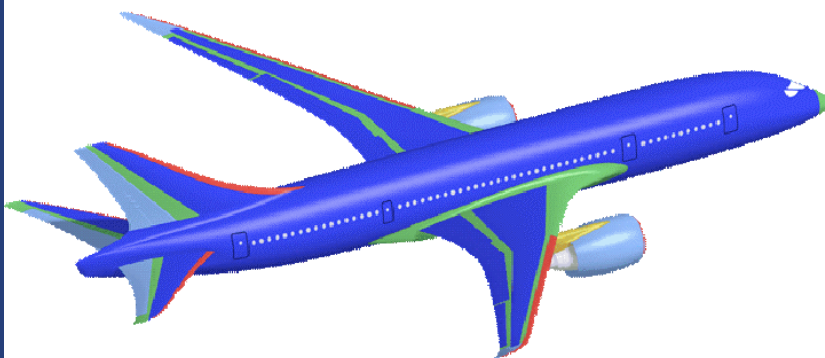
Class D – Mg Fire Tests



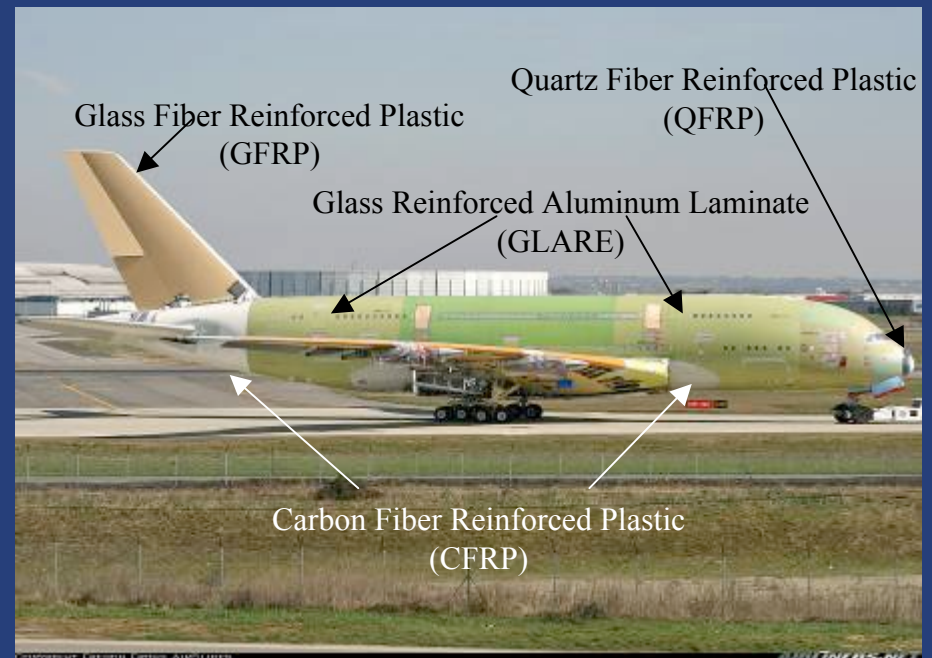
# Composite Fire Fighting

- Effective extinguishing agents.
- Effective extinguishing methods.
- Quantities of agent required.
- Hazards associated airborne composite fibers.

## B787 Structure



- Carbon laminate
- Carbon sandwich
- Fiberglass
- Aluminum
- Aluminum/steel/titanium pylons



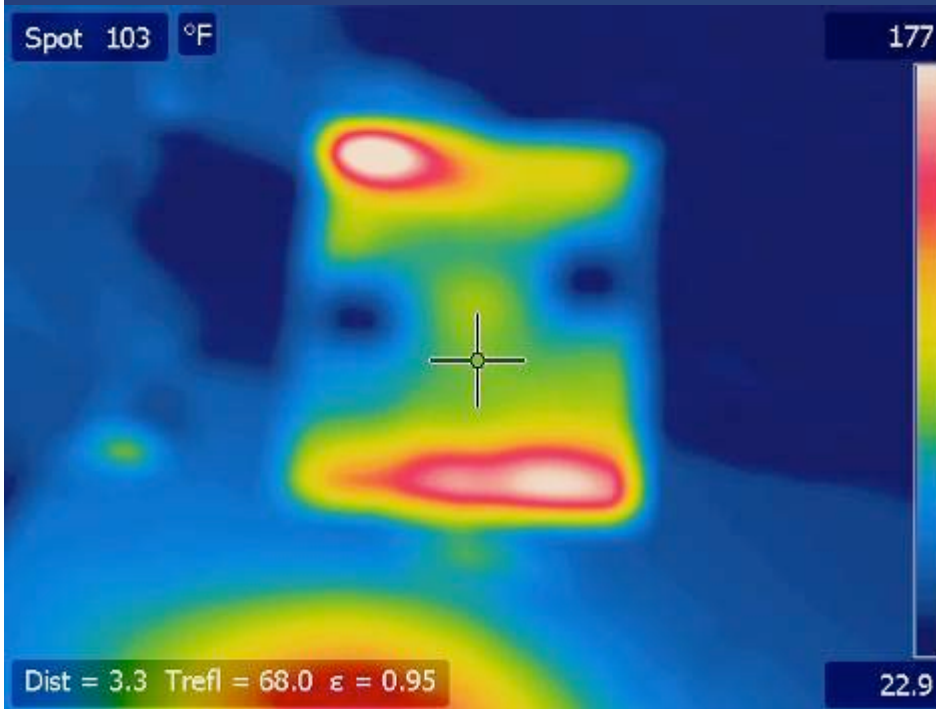
# Composite Fire Fighting

## B2 Bomber Crash in Guam

- Six hours to extinguish fire.
- 83,000 gallons of water and 2,500 gallons of AFFF.



# Composite Fire Fighting





# Composite Fire Fighting

- Hazards associated airborne composite fibers





# Interior Access

- **Primary function would be to aide fire fighters in making a safe and rapid entry to an aircraft fuselage. By getting rapid access to an aircraft fuselage, fire fighters may assist during passenger evacuation, rescue passengers, extinguish interior fires, assist during security operations, etc.**

**Emergency Evacuation**

**Unusual Aircraft Angle/Attitude**

**Interior Rescue**

**Interior Fires**

**General Access/VIP**

**Unusable Doorway Exits**

**Windy Conditions**

**Medical Response**

**Security Ops**

# Interior Access



# Interior Access



# New Fire Fighting Agent Discharge Technologies

Beginning of evolutionary change in ARFF with newer fire fighting technologies being applied to the large ARFF vehicles (+1500 gal).

## Current Examples:

- **Compress Air Foam Systems (CAFS)**
  - Air injected into foam/water solution to create a better expansion rate of the foam.
- **Foam/Dry Chemical/Clean Agent Simultaneous Delivery Systems (Quad-Agent)**
  - Discharging primary and two secondary agents from same point. Increase dry chemical discharge distance.
- **Ultra High Pressure Systems (UHP) – USAF Technology**
  - Discharge pressure of >1200 psi = less agent use and smaller water droplet size



# Compressed Air Foam



# Foam/Dry Chemical/Clean Agent Simultaneous Delivery

- System that has the capability to discharge several firefighting agents from the same point, such as a hand line or turret.



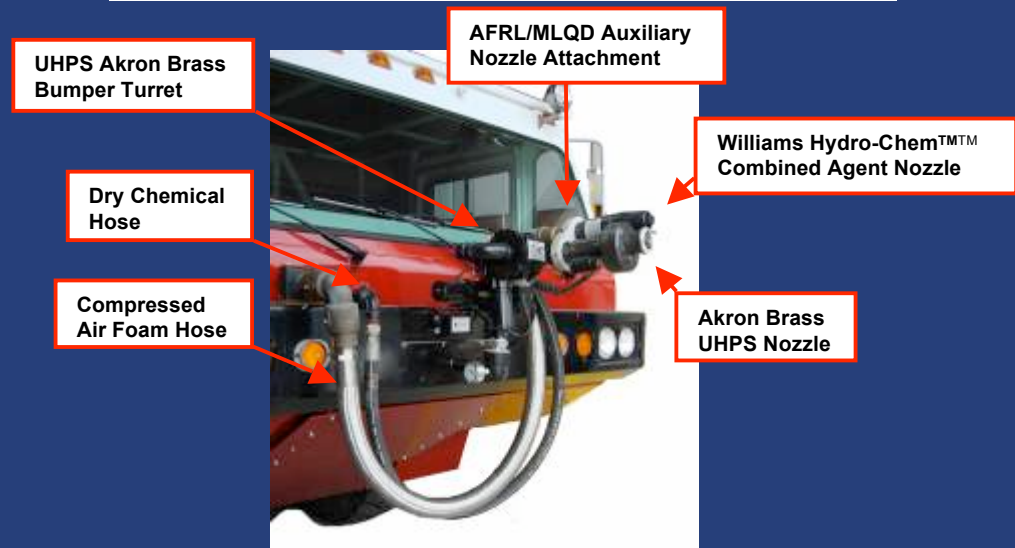
- System uses high pressure and its pulse delivery technology.
- Testing has shown increase dry chemical range.
- System allows firefighter to which extinguishing agent or combinations of agents depending on the situation.

# Ultra High Pressure

UHP P-19 Prototype

## Agent Delivery Systems

- **Ultra high pressure (UHP)**
  - 300 gpm bumper turret
  - 30 gpm 150 ft handline
- **Compressed air foam (CAF)**
  - 300 gpm bumper turret
  - 45 gpm 100 ft handline
- **Dry chemical (PKP)**
  - 12 pps bumper turret
  - 7 pps 100 ft handline



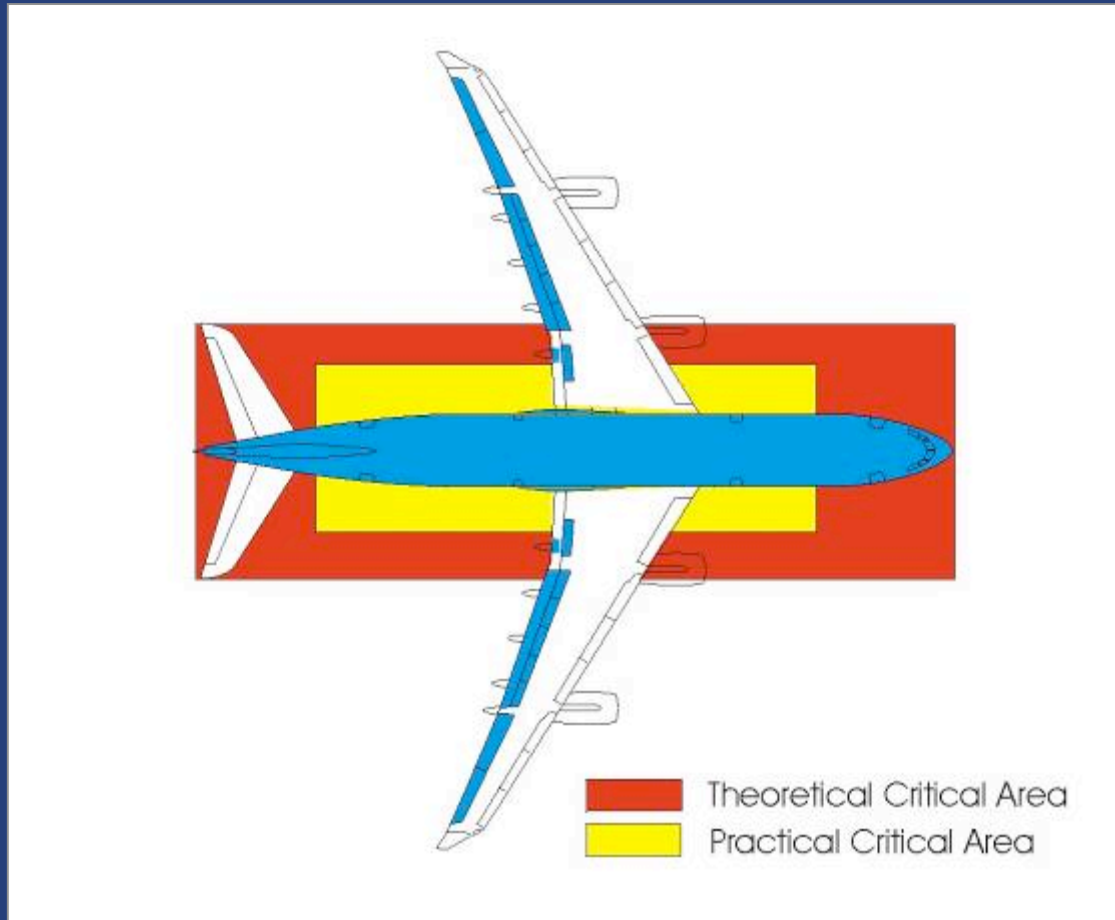
# Operation of NLA

- Does the increase in size, passenger load, and fuel capacity effect current agent quantity calculations?
- Are the airport ARFF strategies, tactics and equipment sufficient for the increased hazards levels?





# TCA/PCA Calculations



# TCA/PCA Calculations

$TCA = L \times (100 + w)$  when L is more than 65'

$PCA = 2/3 TCA$

B777-300 PCA =  $(242 \times (100 + 20)) \times 2/3 = 19,166$  sq. ft.

Q1 = 2,492 gal. AFFF

Q2 = 4,236 gal. AFFF

**Q = 6,728**

Pax. = 348

Max. Fuel = 45,220 gal.

A380 PCA =  $(239 \times (100 + 24)) \times 2/3 = 19,560$  sq. ft.

Q1 = 2,543 gal. AFFF

Q2 = 4,323 gal. AFFF

**Q = 6,866**

Pax. = 555

Max. Fuel = 81,890 gal.

# Adequacy of Airport ARFF Service Firefighting Strategies



**“Our Class....”**

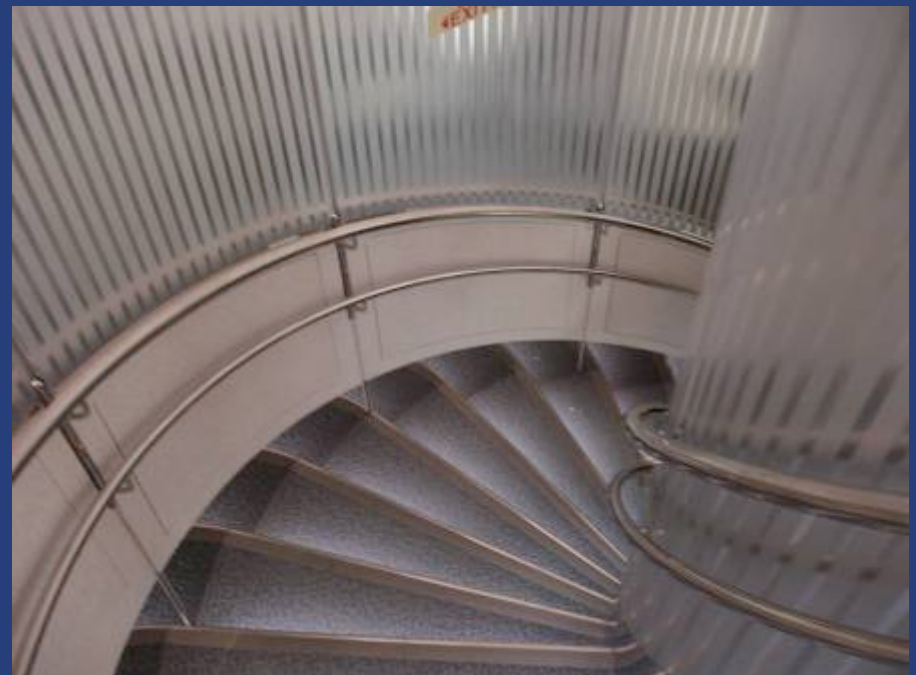


# Adequacy of Airport ARFF Service Firefighting Strategies





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# Questions or Comments?

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